

# FroNTier at BNL

Implementation and testing of  
FroNTier database caching and  
data distribution

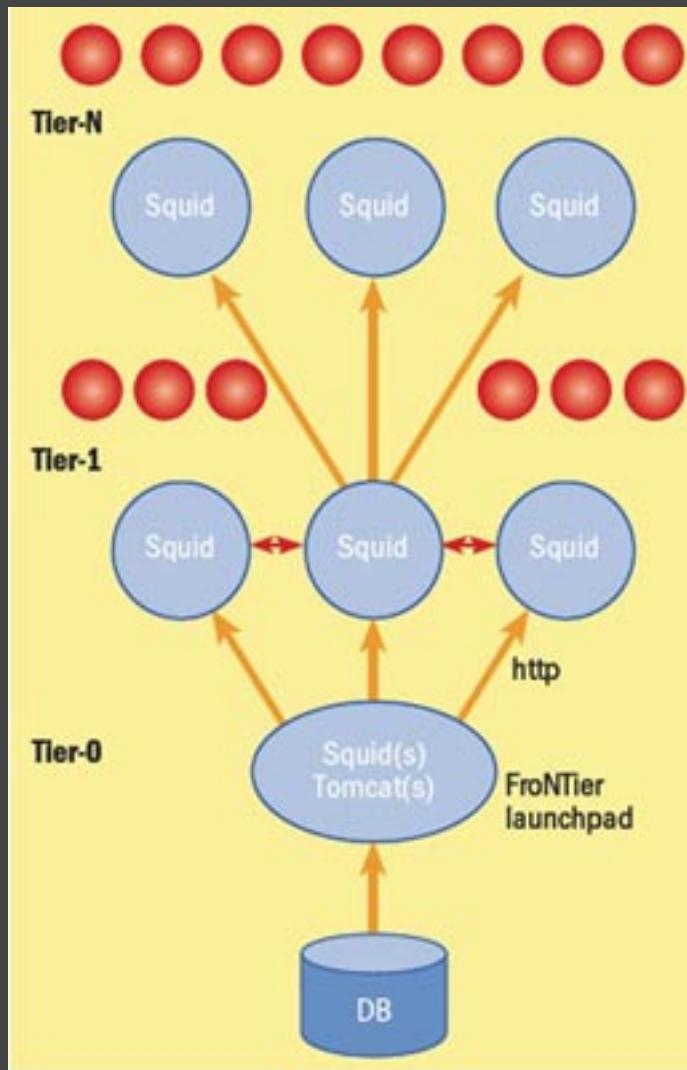
John DeStefano, Carlos Fernando Gamboa, Dantong Yu  
Grid Middleware Group  
RHIC/ATLAS Computing Facility  
Brookhaven National Laboratory  
April 16, 2009

# What is FroNTier?

A distribution system for centralized databases

- Web service provides read access to database
- Supports *N-Tier* data distribution layers
- Developed by Fermilab for CDF data
- Adapted by CMS at CERN
- Used for distributing conditions data

# FroNTier architecture



CMS: FroNTier server with tiered Squids to cache database data

*Image source: CERN Courier, <http://cerncourier.com/cws/article/cnl/27615>*

# FroNTier prerequisites and components

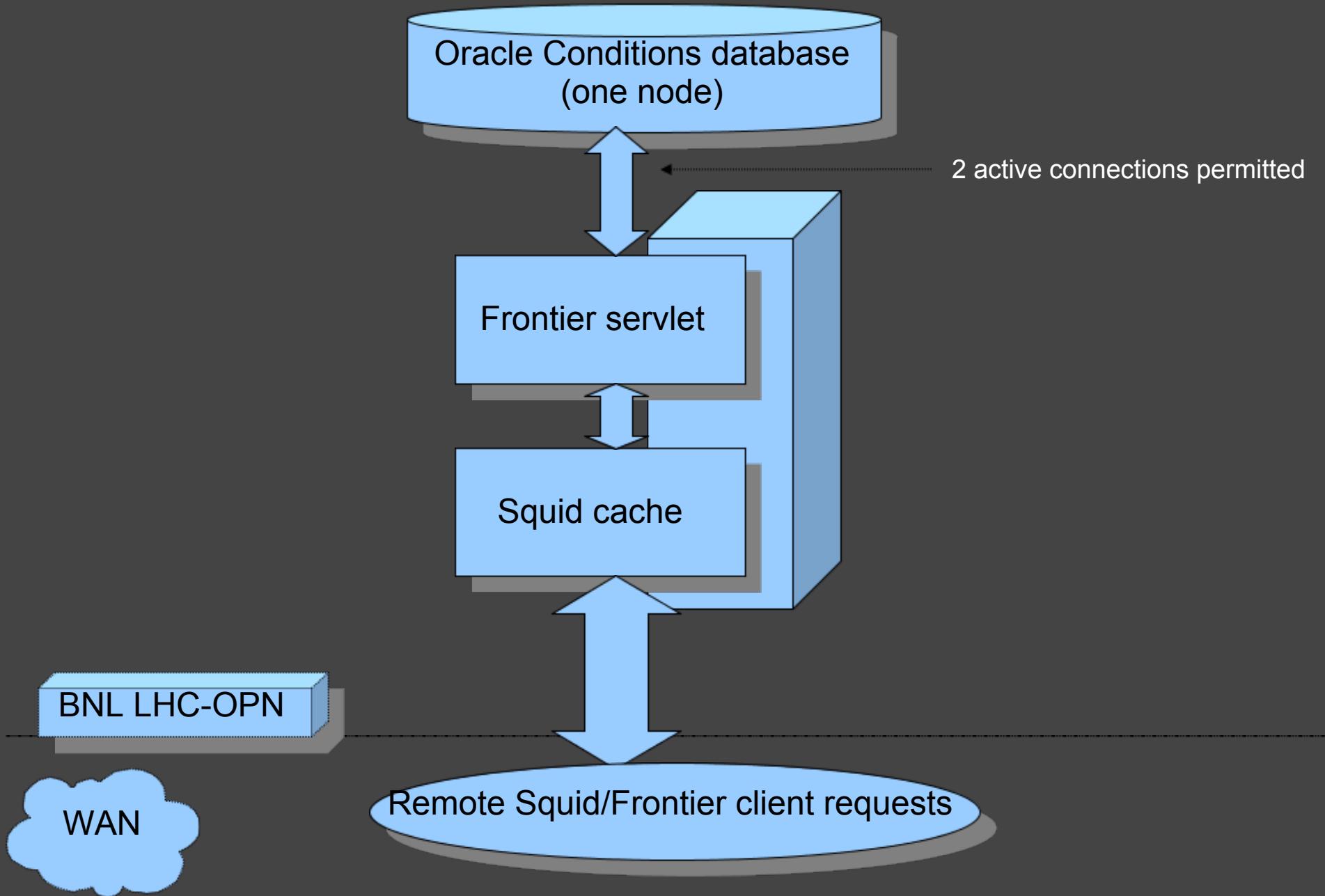
FroNTier:

- Java
- Tomcat
- Ant (optional, for development)
- Xerxes XML parser (optional, for development)
- Oracle JDBC driver libraries
- FroNTier servlet

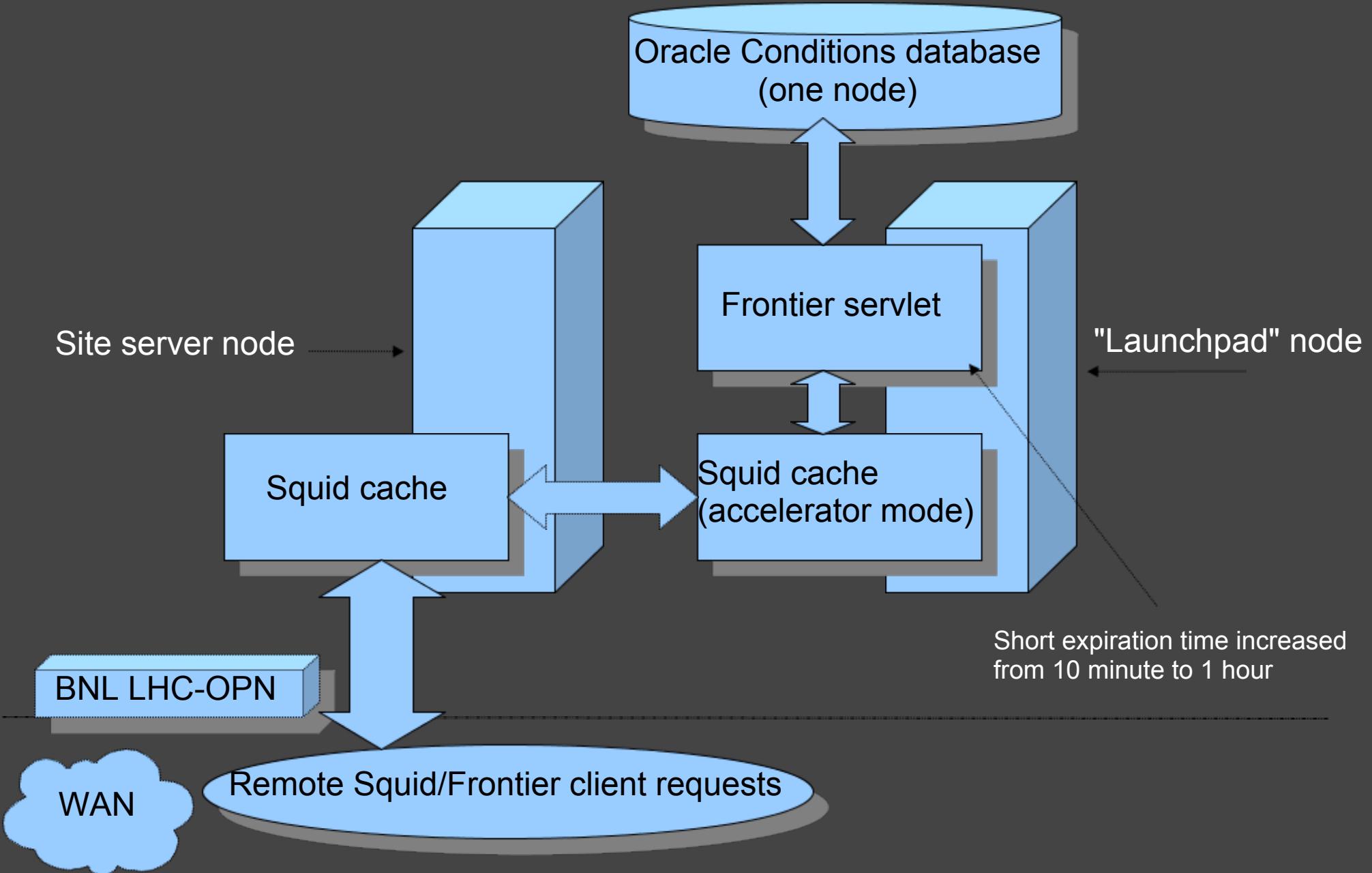
Cache:

- Squid
- Custom shared object libraries (deprecated)
- HW prereqs/recommendations: 100+ GB, 2+ GB, 64-bit

# Initial test bed: single node



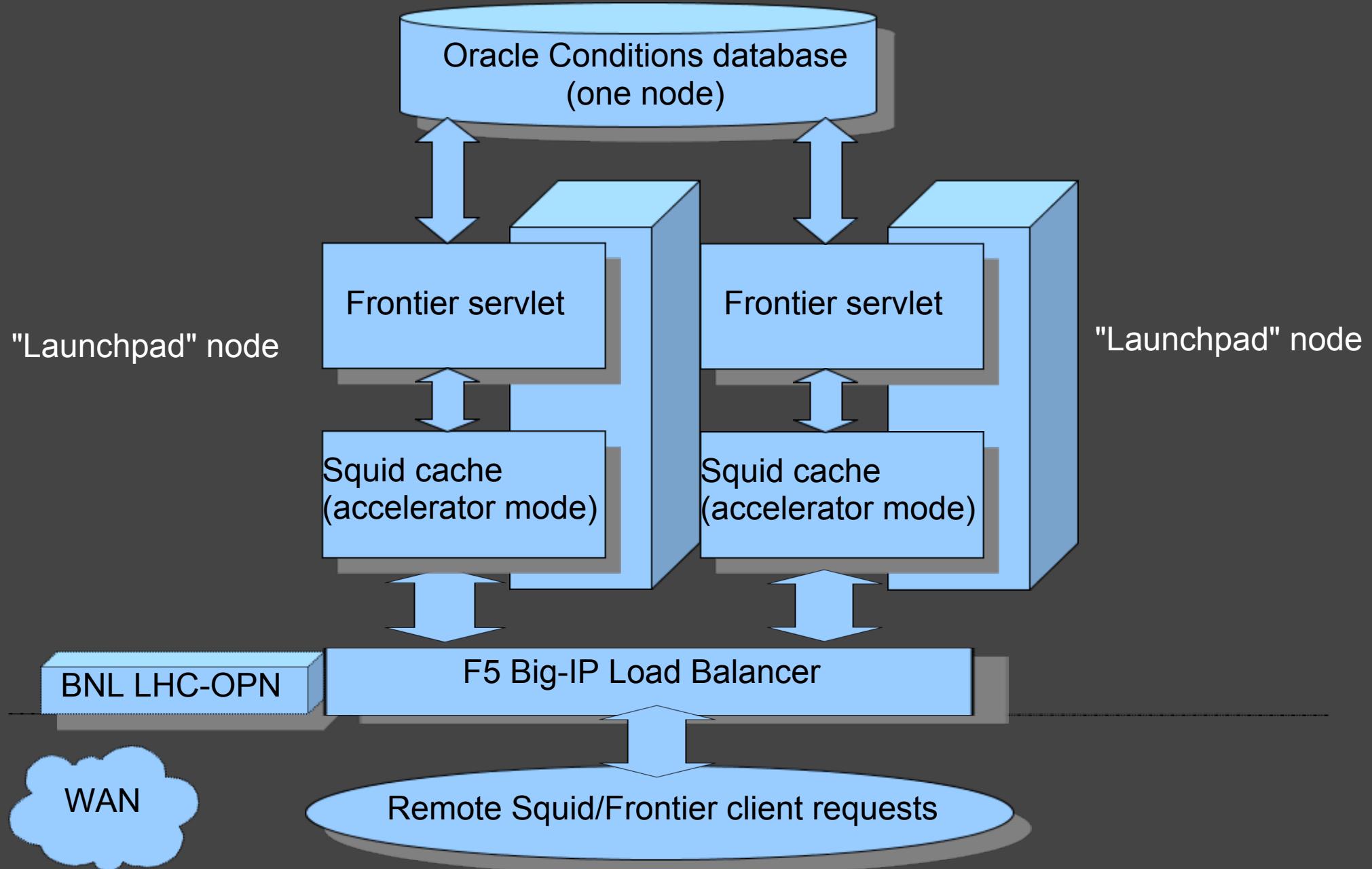
# Initial test bed: two nodes



# AGLT2 Results: Dual-node configuration

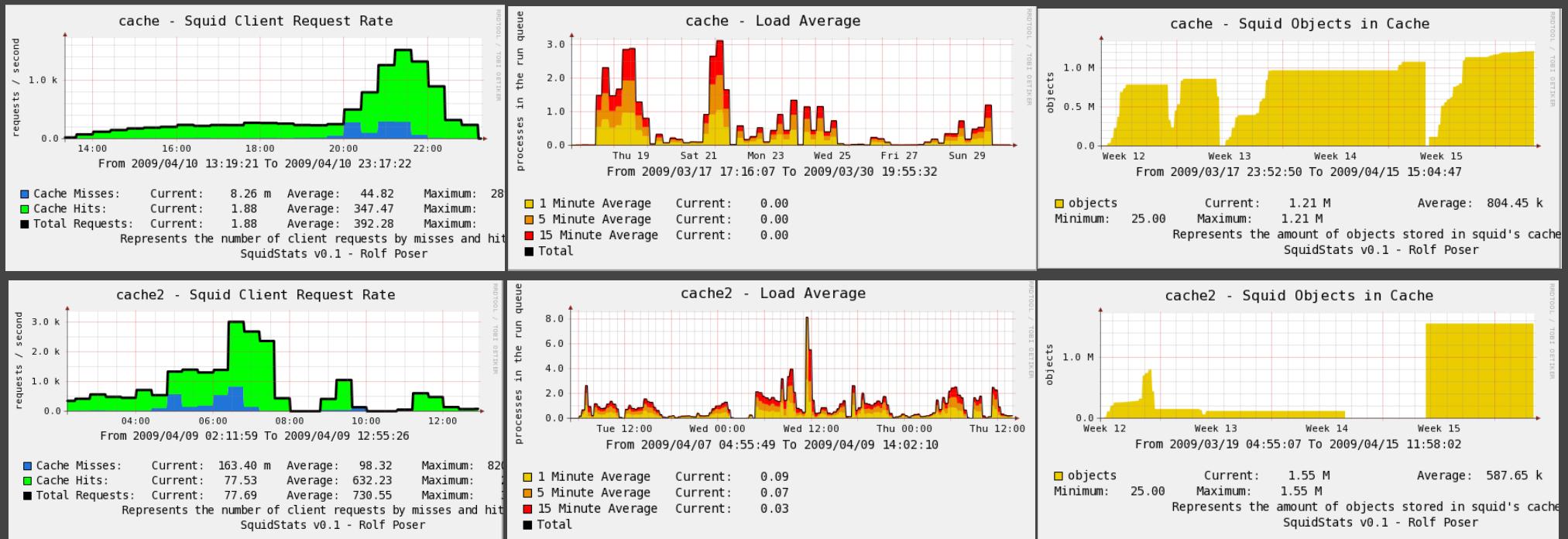
- Feb. 27 - March 2, muon reconstruction, 3 cosmic data (89507, 91060 and 91639) used:
  - 20266 cosmic data jobs, 600 maximum job submission rate from UofM
    - 83 crashes (all from 91060 data)
  - 11115 cosmic data jobs, 738 maximum job submission rate from UofM
    - 35 crashes
  - 37626 cosmic data jobs, 738 maximum job submission rate from UofM
    - 82 crashes; test terminated by Squid log size crash
  - Network glitches *may* have contributed to results

# Current test bed configuration



# Recent test activity from Great Lakes Tier 2

Two local Squid nodes at AGLT2  
Connecting to load-balancing Frontier alias at BNL



- 1-hour sample (4/7/09 6-7 AM): 414,000 load-balanced cache hits seen on Squids at BNL

*Graph data courtesy of AGLT2 Cacti: Shawn McKee, University of Michigan*

# Future plans

- Additional scalability tests for Reconstruction and Analysis jobs
- Possible addition of more cache nodes to BNL test bed
- Aid to additional T2s and other sites interested in testing
- Implement Oracle/Frontier triggers to guarantee cache freshness and coherency, based on Oracle data modification times (Dave Dykstra at Fermi, Tier 0 DBAs at CERN)

# References and resources

- CERN Frontier site  
<http://frontier.cern.ch/>
- CERN CMS TWiki: Squid for CMS  
<https://twiki.cern.ch/twiki/bin/view/CMS/SquidForCMS>
- Frontier at BNL:  
<https://www.racf.bnl.gov/docs/services/frontier>
- US ATLAS Admins TWiki: Tier 2 Frontier configuration  
<https://www.usatlas.bnl.gov/twiki/bin/view/Admins/SquidT2>
- BNL Frontier Mailing List:  
<https://lists.bnl.gov/pipermail/racf-frontier-l>

# Acknowledgments

- RACF GCE  
*Robert Petkus, James Pryor*
- RACF Grid  
*Carlos Gamboa, Xin Zhao, Dantong Yu*
- US ATLAS Physics Application Software  
*Shuwei Ye, Torre Wenaus*
- SLAC  
*Wei Yang, Douglas Smith*
- Fermilab  
*Dave Dykstra*
- TRIUMF  
*Rod Walker*